**Uptake and translocation of arsenic species and cadmium in rice grain**

Martin, M.[1]; Beone, G.M.[2]; Romani, M[3].
[1] DISAFA, Università degli studi di Torino;
[2] Istituto di Chimica Agraria, Università Cattolica del Sacro Cuore di Piacenza;
[3] Centro Ricerche sul Riso, Ente Nazionale Risi

The determination of arsenic in rice, discriminating between organic and inorganic forms, is now required for the commercialization of rice and rice products, since thresholds for maximum admissible concentrations of As in rice have been recently established by the European Commission.
Italian rice is nearly always well below the threshold of 0.20 mg/kg established for white rice, while some problems can be encountered when the rice has to be addressed to the market of baby food products, where the threshold for inorganic As is as low as 0.10 mg/kg. When As is below this limit, Cd content (threshold, 0.040 mg/kg) may be an issue. The reason stands in the redox processes occurring in paddy soils, where the redox potential may fluctuate during the growing season. Continuous flooding enhances As solubility, while more oxidizing conditions limit As availability to plants, but enhance Cd mobility. Determining As (and Cd) availability to plant in paddy soils is difficult and several soil extraction methods fail to predict the accumulation of these contaminants in rice grain.
On the other hand, several methods allowing As quantitative extraction and speciation from rice grain have been proposed and adopted by many laboratories. Arsenic is commonly extracted with relatively diluted acids and As forms determined with HPLC-ICP-MS, with good recoveries. The inorganic As species detected are the oxyanions of As(III) and As(V), while the organic species are represented by dimethylarsinic acid ($DMA^V$) and small amounts of monomethylarsenic acid ($MMA^V$). Recently, however, thiolated As species have been detected both in the soil solution of submerged rice fields and in rice grain at concentrations similar to those of $DMA^V$. The relevance of these species, sensitive to acid extractions, for As plant metabolism and for human health is still to be clarified.